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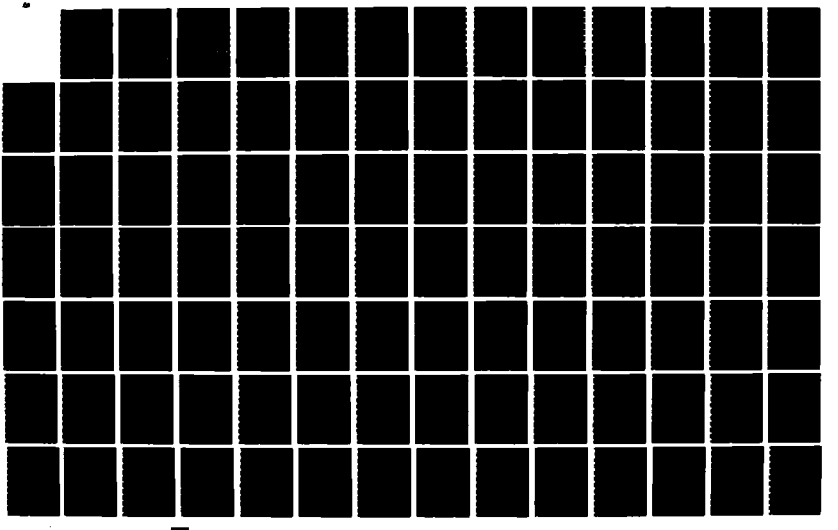

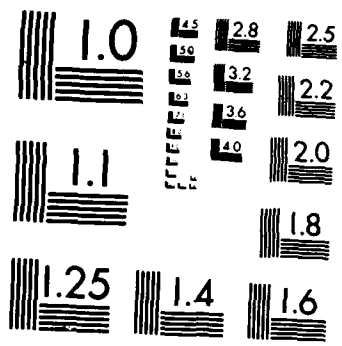

PROBLEMS WITH MAINTENANCE PLANNING ON JOINT SERVICE ACQUISITION PROGRAMS AN AIR FORCE PERSPECTIVE

THESIS

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AFIT/GLM/LSY/86S-16

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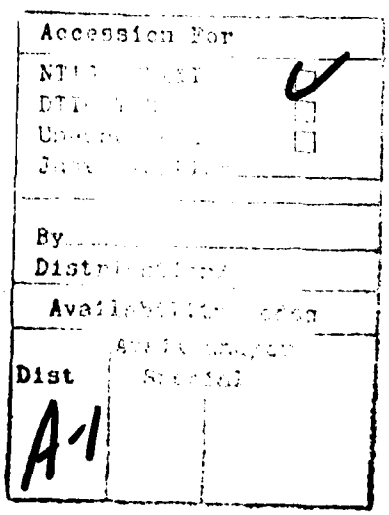

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THESIS

Presented to the Faculty of the School of Systems and Logistics
of the Air Force Institute of Technology
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Abstract

Joint service acquisition of defense systems have the potential to provide cost savings to the Department of Defense by eliminating duplicated efforts. However, these types of programs experience many problems during their acquisition, particularly in the maintenance planning area. The author discovered that most of the problems in maintenance planning are in coordination/decisionmaking, maintenance/operational concept differences, and the differences in service business practices. Coordination/decisonmaking problems are most often affected by the lack of collocated logistics personnel. Maintenance/operational concept differences are most often hampered by the inability to define requirements, differences, and limitations imposed by service operational and maintenance concepts. Important issues affecting service business practices are the unequal emphasis of logistics on joint programs and the way requirements are determined. After discovering these problems, the author makes recommendations for improvement.

I. Introduction

Background

The acquisition of new military systems plays an important role in the future defense posture of our country. The proper implementation of these new systems plays a more important role in determining future defense capabilities. In an age of rising budget deficits, the U.S. Congress and taxpayers have taken renewed interest in the proceedings of the Department of Defense (DOD). Because of these factors the DOD and in particular each military service are concerned about how funds are appropriated, how funds are used, how better to achieve efficiency on new systems, and how to improve maintenance capabilities during the implementation process. Joint service programs have been seen as a way to achieve potential cost savings while at the same time achieving military efficiency and effectiveness through multi-service cooperation. However, these programs have not been free from difficulties encountered between the services during their development.

Research Objective

The purpose of this research effort is to focus attention on maintenance issues of joint service programs from the Air Force perspective. In particular, the purpose is to identify and highlight some of the barriers to implementing joint service maintenance requirements and planning joint service

maintenance. This research effort will also present some proposed methods to resolve some of these problems as perceived by Aeronautical Systems Division (ASD) joint service program personnel.

Research Scope

The research proposed will address the implementation and planning of maintenance/maintainability requirements and capabilities on joint programs from the Air Force (AF) perspective. In the context of this proposal, joint programs, joint service programs, and multi-service programs are synonymous. The research will address problems that occur within AF program offices which affect the ability of AF personnel to plan maintenance capabilities and implement maintenance related requirements and policy. This research will not cover any of the other integrated logistics support (ILS) elements except to the extent that they are used to effect maintenance planning. It also will not cover conflicts between program office personnel, and the affect of budget cuts on each area of maintenance planning.

Research Questions

This research effort will attempt to explain some of the reasons that maintenance related problems are experienced on joint service programs. The following list of questions is expected to provide some answers to this particular dilemma on joint service programs. It should be pointed out that this is not an all inclusive list.

1. How are joint service programs initiated?

2. What items/documents are used in the coordinating and decisionmaking process?

3. What service decides the requirements for a support package (e.g. levels of maintenance, requirements, maintenance concept)?

4. What types of coordinating/decisionmaking problems exist between or within the services?

5. How do facets of the maintenance and operational concepts contribute to maintenance problems?

6. How are inconsistencies between the services worked out?

7. Who makes decisions and at what level are they made with respect to the direction of the program and its effect on implementing maintenance guidance and establishing maintenance requirements?

8. How much additional time does it take to coordinate decisions between services?

9. Are there service specific requirements that make maintenance planning and implementation more difficult to accomplish?

10. Does the structure of each service command contribute to coordination problems on joint service programs?

11. What ILS areas are affected that in turn impact maintenance planning?

12. What practices are used by the services that affect maintenance planning?

Literature Review

"An ideal joint major system acquisition program is two or more military services getting together ... to agree on military capability needed by collaborating through development and procuring versions that are essentially alike" (1:i). The intent of joint programs is to save money through joint development, procurement, and logisitics support of as many components as efficient while not sacrificing military effectiveness. Critical factors of such programs are system compatiblity and the timing of a joint program merger (1:29).

As mentioned earlier, maintenance/maintainability aspects of a program play a major role in that system's contribution to the overall defense posture of our country. Therefore, the implementation of policy guidance/requirements and the planning that must take place to allow an effectvie maintenance capability in these areas cannot be overlooked. Joint service programs, in general, have been the subject of increasing focus in recent years. This literature review will examine the existing joint service program environment and some of the studies that have addressed problems on this particular type of program.

Joint Program Environment. Tales of government waste and abuse, and resulting pressures on procurement programs have caused increased scrutiny from the Congress. Congres-

sional committees will be addressing ways to induce the Navy, Army, Air Force, and Marines to embrace rather than resist joint procurement. As a result of the current budget deficits, Congress feels that the services will have to procure and use more weapons in common instead of insisting on dedicated, service specific weapons (5:31). One Congressional viewpoint is that of Representative Mel Levine, who states: "... to win back the trust and support of the American people it is vital to make fundamental reforms in the procurement system" (5:32).

Critics of the current procurement system feel that weapon system design and development does not emphasize cost tradeoffs and optimization (5:37). Some of the suggested proposals have been to increase the support for joint service undertakings as well as provide increased attention to stressing Department Of Defense (DOD) cooperative solutions rather than individual service-specific solutions. James Wade Jr., Assistant Secretary of Defense, Acquisition, and Logistics feels that "a system with more clearly defined lines of authority, responsiblity and accountability has a far better chance of success" (5:37).

There are other considerations that must be addressed in order to understand the current emphasis on joint programs and inherent problems with these programs. These areas are: recent organizational changes; changes in the review process; and new developments in identifying requirements solutions.

" The Defense Department has reorganized its acquisition system and management structure to streamline and improve the planning and programming phase of acquiring new weapon systems" (4:81). One major change was the development of the office of the Assistant Secretary of Defense for Acquisition and Logistics to make a single executive responsibile for system procurement in addition to support requirements and resources (4:81). This move was also to improve the management of acquisition, logistics, and command, control, communications and intelligence (C^3I).

In addition to the reorganization, the review process was changed and new requirement validation procedures were developed. The review process was changed to provide more service involvement and procedures were introduced to assure an adequate perspective of senior military commanders' needs and concerns were available during the planning and programming phases of acquisition. This reflects a Congressional desire to increase joint service programs to enhance effectiveness, economy, and efficiency in program and management activities (4:81). The Joint Chiefs of Staff (JCS) have attempted satisfy this request by establishing the Joint Requirements and Management Board (JRMB) to examine potential joint military requirements, recommend joint development candidates, and resolve service requirement issues after program initiation (4:81).

The current situation of joint programs and their associated problems have created an environment of concern and

change. Over the last five years interservice cooperation has worsened (5:35). There have been studies completed since that time that have relevance to the research problem being addressed. These studies are addressed in the next section.

Joint Program Research. A review of research studies addressing implementation and joint service program problems over the last six years was conducted for inclusion in this literature review. There were a number of studies accomplished that were considered relevant to this research effort. These studies and their findings are incorporated in the following sections.

GAO Study. The GAO completed two studies for Congress on acquisition programs. The first study was titled Weapon Systems Overview: A Summary Of Recent GAO Reports, Observations And Recommendations On Major Weapon Systems. This study was basically a review of some major acquisition programs by the GAO. The GAO provided recommendations to Congress to resolve some of the problems on these programs based on their review. Two joint service acquisition programs were reviewed. They were: the Light Armored Vehicle and the Advanced Medium Range Air-To-Air Missile (AMRAAM). The findings from the Light Armored Vehicle study were as follows.

- The program requirements were often fluctuating which resulted in changing contract buys and reduced purchases.

- The Army and Marine Corps started development of the vehicle at different times and then combined programs. However, since the Marine Corps started development one year ahead of the Army, the Army could not do some of the testing it desired. Therefore, testing by the army would have to be accelerated and some of the testing required to provide sufficient reliability and maintainability data for the army will not be available until after a production contractor is selected.

- The GAO also found that the airlift required for these vehicles was not available to meet deployment schedules (2:84-85).

The final recommendation by the GAO was to place the Light Armored Vehicle program under a Selected Acquisition Reporting System to ensure that its progress can be closely monitored (2:86).

Review of the AMRAAM program addressed operational requirements, affordability, testing, and program concurrency. The GAO was still reviewing this program when this GAO report was published. However, their findings at the time of reporting were as follows.

- Assessments made of the operational usefulness of the AMRAAM highlighted its favorable combat attributes.

- There were schedule problems on the program. Some of the full-scale development testing continued well beyond the initial commitment to production.

- The acquisition costs of the system had risen dramatically over three and one half years (2:88).

This was the information provided to Congress to identify program issues that required development.

The second GAO study accomplished for Congress was titled Joint Major System Acquisition By The Military Services: An Elusive Strategy. The purpose of this study was to determine the feasibility of joint service programs and assess proce-

dural or organizational changes to foster success and acceptance. The study was also to determine if service reluctance to cooperate was the main problem and what means could be devised to settle joint requirement conflicts.

The measures of success used for this study were substantial commonality, documented savings, and reasonably satisfied services (1:ii). Based on these measures the GAO felt that there have been no real successes. The GAO cited agreement between services on joint requirements as the biggest hurdle to overcome (1:ii). Additional details of the study explain why this was a major problem.

According to the study, each service has the initiative in setting program requirements and believes that its doctrine, operating - technical requirements, and choice of system and technology are best for the mission and the country (1:7). This makes the services reluctant to compromise their ideas. In addition each service's weapon requirements are shaped by doctrine (i.e., regulations, direction, and principles that govern a service's tactics, methods, training, operation and integration of its forces and equipment). These doctrines, perceptions of requirements, and operational features keep services apart (1:12).

Achieving agreement on logistics was considered to be one of the more difficult problems. This was attributed to each service having its own methods, standards, data requirements, manuals, test requirements, training methods, specifi-

cations, and so forth, all of which affect the design and configuration (1:16). These areas have a direct impact on the implementation of maintenance/maintainability requirements and guidance.

Another problem covered in the study was the lack of a military chief to resolve cross-service disputes. This issue has been somewhat resolved by the formation of the JRMB mentioned earlier. However, there is still some degree of bias within this group in resolving joint service conflicts that must be eliminated (1:22).

One final area of the study that is relevant to the research problem is the impact of the program office organization. The lead service provides the staff support, underwrites the joint program office, and may finance most of the development. The lead service is bound by a charter from the service headquarters but the other services are not necessarily bound by it (1:24). This can create potential problems when agreements must be made.

The findings of this study made a number of recommendations. These recommendations were the following:

1. Let the Under Secretary of Defense for Research and Engineering (USDRE) manage all joint service programs.
2. Empower the JCS to settle conflicting service requirements.
3. Establish joint service guidelines to:
    a. Avoid compromising essential service doctrines
    b. Prevent the lessening of military effectiveness
    c. Enlist the support of Congress, the JCS, and the top military officers

d. Insure that program merger occurs early in development (1:30)

Multi-service Acquisition Problem Study. The purpose of the research study titled Problems in the Multi-service Acquisition of Less Than Major Ground Comunications-Electronics Systems was to identify problems which arise when the Army, as the executive service, acquires ground communications-electronics systems for Air Force use. Once problems were identified, the research objective was to recommend changes to correct the problem (3:13). This study was selected because it parallels the approach to be used for the proposed research study.

Although this study addresses a program on which the Army is the lead service, it can be beneficial to the research proposed. The Army study looked at deficiencies in regulations and directives used by multi-service personnel in addition to coordination problems. The findings indicated that the directives were not detailed enough and that tailoring of requirements resulted in non-standard procedures between services (3:41). Tailoring involves adding additional requirements to the data item descriptions (DID) used on contracts. The services sometimes find it necessary to do this when there are additional requirements they want fulfilled on a contract. Other responses were the lack of clear terminolgy in joint service guidance and the lack of formal program guidance. These issues will also be investigated in this research.

The Army study made a number of recommendations that could be considerations in this proposal. The recommendations were as follows:

1. The Standard Integrated Support Manual (SISM), a key document used in the procurement, should be retained in its present form.

2. Detailed procedures should be incorporated into existing regulations after joint service coordination occurs.

3. Establish a joint service working group to coordinate specific multi-service procedures with the endorsement of the Joint Logistics Commanders (JLC).

4. Tailoring of multi-service prodecures should be limited once they are included in the service regulation (3:121-123).

Conclusion

A review of the literature revealed a number of problems with joint programs. The major theme seems to be that joint programs are a management challenge to the services. In the areas investigated the data indicate there are problems with the use and availability of joint regulations/guidance, the resolution of conflicts between services, coordination between the services, organizational structure, individual service practices, and requirements determination. All of these problems affect program planning and implementation in one form or another. However, the body of knowledge reviewed to date indicated that there is a void in the specific area of implementation as it relates to maintenance/maintainability aspects. Therefore, by identifying barriers to effective

implementation and offering proposals for solutions, the author believes this study will contribute to the body of knowledge on joint programs in this particular area.

II. Research Methodology

Research Plan

The intent of this research was to document and identify some of the major difficulties encountered by Air Force logisticians in their attempts to adequately plan and implement maintenance on joint service programs. The focus of this research concentrated almost solely on practicing logisticians in ASD system program offices (SPO) who perform the logistics planning for these joint service programs. Joint service program offices at the ASD product division were selected because of the wide range of programs developed there. This effort was exploratory in nature because of the relatively small amount of available data on joint service programs pertaining to problems in the maintenance area. Therefore, it was the intent of the author to draw on the opinions and expertise of AF SPO logisticians to gain some common insights to maintenance planning issues affecting joint service programs regardless of the lead service, the type of program, the size of the program or the importance of the program.

In order to gather the data for this research effort a personal interview was used. In conducting the interviews the author used a survey with open-ended questions. This method was determined to be the most useful way to gather detailed information regarding the effect of the areas ad-

dressed on maintenance planning and implementation as well as explanations of these issues. The personal interview also allowed the author to learn more about these same issues than would have been possible with another instrument. Since the personal interview was used, the analysis of the research was primarily qualitative. However, there was some statistical analysis performed on the demographic data. The research instrument, the research data bank, and the step by step research approach will be detailed in the rest of this chapter.

The Survey Instrument

The survey instrument employed was a personal interview. The interview questions were structured such that they elicited open-ended responses from the people being interviewed (See Appendix B). This allowed a more detailed explanation of problems to be provided. The personal interview also permited extended discussion of issues relating to a certain area, probable solutions to maintenance planning/implementation on joint service programs, and possible future research.

The initial research was to identify the primary areas that affect the ability of AF logisticians to adequately plan and implement maintenance on joint service programs. This resulted in the identification of three primary areas. They were: 1) coordination/decision making, 2) maintenance/operational concepts and planning factors, and 3) differences in the way that each service conducts business. These areas

formed the basis of the survey. The remainder of the survey was comprised of demographic data collected during the interview. These data were collected to provide information relative to the experience of AF logisticians working on joint service programs, the number of joint service programs previously worked, and any previous acquisition logistics experience which might be a relevant factor that should be considered for manning joint service program offices.

The survey instrument was pretested by interviewing four people with SPO acquisition logistics experience and some degree of joint service logistics experience. Each pretest subject was working or had worked in an ASD SPO. The pretest objectives were to insure the interview was addressing the right areas, to determine if the questions asked were clear and understood, and to evaluate the content of the responses provided by the people interviewed (i.e. to see if the interview was structured in a clear and concise manner).

Data Bank

In gathering data to be incorporated into the data bank the author had objectives in mind relative to what data were to be collected and how they were to be collected/incorporated. These objectives were as follows:

1. The primary people to be interviewed would be logisticians working in joint service program offices (people who worked in ASD with previous joint service program experience were also candidates for interviews).

2. Most of the interviews would be with logisticians who actually did the maintenance planning or were in a decision making position.

3. Joint service program offices that were classified would not be considered in this research effort because of the possible complications created by program classification and reporting.

4. Logisticians interviewed outside of ASD would be interviewed only to provide background and pertinent information relevant to maintenance related problems.

The main emphasis of this research was on the logistician in ASD joint service program offices who must address maintenance planning and implementation. It was felt that these people would best be able to identify and explain problems in this area because of their day-to-day involvement.

The people interviewed worked on a range of joint service programs that varied in terms of size, dollar value, and importance. These programs were selected by using the Acquisition Logistics Management Information System (ALMIS), an ASD listing of joint service programs, and information provided by SPO personnel with knowledge of other joint service programs that may not have been listed in either of the other two sources for some reason (e.g. dollar value of the program was too small to require inclusion in the ALMIS, the program identified was no longer special access, or the program was new). The ALMIS was the primary means used to identify joint service programs. The purpose of the ALMIS is to provide

"real time" program information to resource managers and decision makers in acquisition logistics. The ASD joint service listing was reviewed to see what programs were being worked in a SPO and expected to result in operational hardware. Many of the programs were laboratory programs and therefore, not considered in this thesis research. The list of programs from which people were interviewed included the following:

1. Infrared Search and Track (IRST)
2. INEWS - Integrated Electronic Warfare System
3. Aircrew Eye/Respiratory Protection Program
4. MCU-2P Chemical Defense Mask
5. Hand Held Mark XII Interogator Test Set
6. Mark XII (TIP) Technical Improvement Program
7. Standard Central Air Data Computer (SCADC)
8. V-22, Joint Services Advanced Vertical Lift Aircraft
9. BGM-109G Ground Launched Cruise Missile (GLCM)
10. HH-60A Combat Helicopter Modernization Program
11. JVX Engine (Engine for the V-22 aircraft)

The programs are very diverse in nature. They vary from small stand-alone items to component systems of aircraft to complete aircraft. Some of the systems identified, although joint service, are AF versions of the same or similar system used by other services. The trait the programs have in common is that they are all used to provide some type of wartime capability (i.e. life support, repair, rescue, threat

identification, tactical, or strategic). Programs that did not provide some type of wartime capability were not considered in this thesis research.

The programs from which people were interviewed were considered to have some common basis of comparison even though their size and relative importance varied. Regardless of other factors, the procedures and management philosophies are considered to be very much alike. In addition, the research investigated three common problem areas on each program to determine how similar these problems are to a range of joint service programs. Any similarities discovered could also be pursued in future research or by the other services to determine if these problems are viewed in the same manner by their joint service program personnel.

Research Approach

In approaching the thesis research, a plan was formulated to conduct each part of the research effort. After selection of joint service programs as the topic of research, it was determined that ASD joint service program offices would serve as the primary population of interest. The latter decision was based on the range of acquisition programs at ASD, the proximity of the ASD community, and the ability to conduct personal interviews as the preferred method of data collection. The framework for the balance of the research approach considered this preference as a basis. The other areas that were planned were identification of the

people to be interviewed by program, development of the survey instrument, validation of the instrument, interviewing of logistics personnel, and collection of the data. Interpretation of the data was a subjective analysis (based on the type of data) of what the data seemed to indicate.

Prior to conducting the interviews, a survey instrument was developed. The instrument was divided into sections so that it captured demographic information and data considered relevant to joint service problems. In order to validate the survey instrument the author asked the survey questions to people with previous acquisition experience (three years or more) who were working or had worked on joint service programs. The information received during this validation helped the author pinpoint the areas to be concentrated on in the research interviews. The primary areas were: coordination/ decision making, maintenance/operational concepts, and the way the services do business.

In order to identify the programs from which people would be interviewed the ALMIS was used as the primary basis for selection. Once a program and its Deputy Program Manager for Logistics (DPML) were identified, the DPML was contacted to set up an appointment. At this time the researcher identified himself, the purpose of his research, and requested interviews with people available and willing to discuss the research topic. People were interviewed based on their ability and their willingness to participate. In order not to violate the anonymity of the interviewees' responses, their

comments were not cited but are included in this study (See Appendix C). The names of those people who submitted to questioning for this research are also included (See Appendix A).

The actual interviews were conducted next. Each person to be interviewed was called and given an explanation of the thesis purpose and the areas of interest. The primary areas of concern validated during the pretest were concentrated on during the course of the interviews. Recommendations were requested for the resolutions of these problems as well as for areas requiring attention in the future.

Limitations

There are some limitations associated with this research effort primarily due to the limited data collected and the limited previous joint service research accomplished. Since only AF logisticians from one product division were interviewed regarding the three problem areas, there is a certain amount of bias to be expected in the interview responses. Another limitation of the research is the inability to do any significant statistical analysis. Because the data were obtained using the interview technique and was qualitative in nature, it does not lend itself to statistical analysis. There are also some limits as to how much of this data can be generalized to the other services.

Despite the recognized limitations of this research, there are still real benefits that can be obtained from it. The data can be used to highlight the extent of problems in

the three areas investigated on joint service programs. Benefits can also be derived from this study by using some of the recommendations to develop plans and procedures that will preclude the occurence of many of the problems, identify them when they do occur, propose steps to take to resolve them, and provide some method to ensure early integration of these issues during a joint service life cycle.

III. Research Results

Maintenance Background

Chapter II presented the methodology and the steps taken to conduct this thesis research effort. This chapter will present the results of the nineteen personal interviews conducted to accomplish this research. However, prior to presenting these results, some background will be provided on how the services perform maintenance to give the reader some perspective of the aspects involved in maintenance planning by the services. The programs from which people were interviewed were in various stages of development. They ranged from validation to deployment with the majority being in full scale development (FSD). After presentation of the service maintenance backgrounds the results will be presented for the demographics, coordination/decisionmaking, maintenance/operational concepts, and service business practices.

Navy maintenance is focused on two areas of emphasis. One part of the Navy deals with the air and the other emphasis is on the sea. This distinction must be made when discussing functions of the Navy, particularly when maintenance is the topic of discussion. Naval maintenance policy is somewhat different from that of the other services when you consider the two entities mentioned as well as the additional factor of the marines. The Navy owns Marine Corp aircraft and manages Marine Corp aviation with participation from the

marines.

The Navy has a policy of having maintenance repair capability for major systems on each coast. Naval air forces commonly use three levels of maintenance (organizational, intermediate, and depot). The air and sea Navy very rarely use two level maintenace (organizational and depot). This is especially true in the sea environment because of the severe space constraints. Organizational maintenance performed on ships is similar to aviation maintenance. Complex jobs are normally not done on the small ships (destroyers and cruisers). These ships usually do O & I level maintenance by sparing parts or replacing components. Depot repair for the ships is performed by the Navy ship yards. Depot repair for naval aviation squadrons is performed by Naval Air Rework Facilities (NARF). As a practice the Navy collocates operational forces and depot troops. As a result the depots provide direct support to the operational forces particularly in the form of unprogrammed maintenance. Two other distinctions must be mentioned when talking about the sea Navy. The first is that the maintenance capability on ships and aircraft carriers is not the same. Aircraft carriers can and do perform all three levels of maintenance onboard because of the distances from port and the long pipelines from the depot facilities. The other distinction is that Navy ships are supported by Shore Intermediate Maintenance Activities (SIMA) that do small repairs for ships they support.

The Army as a service uses three levels of maintenance

to provide a repair capability for its systems. However, two of these maintenance levels can be broken out into two additional levels within each category. Organizational maintenance can be allocated to the crew or to the organization (i.e. the operator or to the motor pool respectively). Intermediate maintenance consists of intermediate forward and intermediate rear maintenance. Intermediate forward maintenance is done on assets that are organic within the division. Intermediate rear maintenance is maintenance done to the rear of the division but within theater. The use two level by the Army does not apply to the motor vehicles and is normally only considered for electronic sytems and components. The Army also has many commodity peculiar maintenance concepts that are used. These commodity peculiar concepts generally apply to electronic systems. The maintenance philosophy for these commodities is basically to pull circuit boards and send them to the depot. For most of the maintenance done in the non-aeronautical area the Army has been using direct support and general support to place the equipment back into an operational status. Aircraft three level maintenance in the Army is much like the three level maintenance done in the AF. Each of these aspects of maintenance are important factors that must be considered when doing maintenance planning.

Air Force maintenance is governed by a three level maintenance concept consisting of organizational, interme-

diate, and depot (O, I, and D-level) maintenance. AF maintenance is somewhat more rigid than the other services. O and I-level repair is accomplished at the deployed aircraft location. O-level maintenance is performed at the flight line and consists of removal and replacement of line replaceable units (LRUs) and general preventive maintenance. I-level maintenance is done in an I-level shop and consists of the removal and replacement of shop replaceable units (SRUs) for shipment to depots. Depot repair is done at one of the five air logistics centers (ALCs) and involves component repair, testing and overhaul. The AF does use two level maintenance (O & D) for those systems that demonstrate a reliability high enough to justify its use.

Data Analysis

There were nineteen people interviewed for this research. Sixteen of the people interviewed were AF personnel. Most of the people were interviewed to get responses reflecting their experience on joint service programs. The remainder were interviewed to provide information on service maintenance backgrounds. This questionnaire was intended to provide data on the three topic areas and identify how they relate to maintenance planning/implementation problems. The majority of the questions were open ended and worded so that the interviewees would have to provide an explanation for the answer provided. Responses were grouped by category and in some cases were cross-tabulated to verify any overlap in

responses. In some instances some questions were not answered because they did not apply to the program in question or were not relevant to the interviewee's experience. The results of the survey will be presented by category. The number of responses will not always match the number of people interviewed. This is in part due to the fact that some people provided additional comments on the question asked. Interpretation of the results will be presented in chapter four.

Section I - Demographic Analysis

This section captures information relative to the level of joint service/acquisition experience, position, rank, and number of programs worked by personnel interviewed in the ASD joint service program environment. The information provided is in the order of the survey questions asked.

1. What is your rank?

The people interviewed ranged in rank from GS-12 to GS-13 for civilians and from MSgt (E-8) to Col (O-6). The majority of people interviewed were GS-12s. There was no significance associated with the ranking of these personnel to maintenance planning and therefore, this area will not be addressed further.

Questions 2, 3, and 4 addressed the experience of the joint service personnel and is presented in tabular format in Table 3-1. The total acquisition experience was presented as well as a breakout of the joint service and single service

acquisition experience. The results are as follows.

TABLE 3-1

Experience

	Avg # Years	Std Dev	Min	Max
Acquisition	4.02	2.82	.8	10
Joint Service	1.62	1.31	.7	5.5
Acquisition (not including joint service)	2.53	1.79	0	.8

The data from Table 3-1 indicates that most of the people interviewed did not have extensive experience on joint service programs. However, on the average, they did have more experience on single service acquisition programs than on joint service programs. In some cases this was prior experience and in others it was not. Most of the people with prior experience had that experience in some area other than acquisition (mainly in maintenance or supply). Questions 2, 3 and 4 are repeated here for convenience.

2. How many years of acquisition experience do you have?

3. How many years of joint service acquisition experience do you have?

4. How many years of acquisition experience do you have not including joint service experience?

Questions 5 and 6 were asked to ascertain the number of joint service programs the people being interviewed had worked on and if they were still working a joint service program. The status is as follows.

TABLE 3-2

Joint Service Programs

Avg # Worked	Max	Min
1	2	1

(Avg value was rounded off to the nearest whole number)

All but two of the sixteen people interviewed with joint service experience were still working on joint service programs at the time of the interview. Question 7 was asked only to determine the interviewee's title (See Related Sources). The questions are repeated here for convenience.

5. How many joint service programs have you worked?

6. Are you currently working any joint service programs?

7. What is your position title?

Section II - Coordination/Decisionmaking

Questions in this section were asked to determine what documents were used in the coordination and decisionmaking process for maintenance planning. Additional questions were asked to determine what types of coordination and decision-making problems existed between and within the services that effected or impeded the maintenance planning process.

As the interviews progressed it was learned that responses were provided for groups of questions, which was attributed to the open-ended nature of the questions and the way the questions were worded. This phenomenon occured on questions 8, 9, and 10 as well as on questions 11 and 12.

8. Were there any planning documents used in which agree-

ments were reached prior to major decisions on maintenance planning?

9. Was there early and sufficient coordination between the services that might have helped facilitate maintenance planning?

10. How did service and program schedules affect your ability to adequately plan maintenance in terms of time?

Responses to questions 8 and 9 were to identify the extent of the use of planning documents to accomplish agreements prior to major maintenance decisions and if early and sufficient coordination took place to help make those decisions. Question 10 was a follow-up to determine the effect of schedules on the time element.

Responses to question 8 indicated that typically there was little in the way of agreed-to documents developed prior to major maintenance planning decisions. Five of the respondents indicated that there was some kind of document developed early (e.g. a memorandum of agreement, joint ILSP, joint specification, etc). However, requirements and responsibilities were not firm and could not be easily agreed to. A schedule was used by all respondents to accomplish maintenance planning but even those were difficult to get agreements on.

Responses to question 9 indicated that there were three levels of responses. Eleven of the respondents pointed out insufficient coordination or no coordination at all. Most of

the comments centered around deficiencies in coordination during source selection, request for proposal (RFP)/statment of work (SOW) preparation, and the development of user requirements. Three people felt that there was enough coordination but that it was slow and unresponsive to the needs of the person making decisions on maintenance planning. The last two responses indicated that there was enough coordination and that it took place early enough to assist the maintenance planner.

Based on the responses provided for question ten, it appeared that most of the respondents felt that schedule conflicts would always be a fact of life on joint service programs because they were either incompatible with service requirements or simply could not be agreed on. One significant factor resulting from this problem was the fact that a service could be forced to do maintenance planning without the luxury of time because of the "schedule crunch". In some cases it seems that the need date for subsystems was determined by the schedule for a larger system (e.g. an aircraft subsystem schedule would determined by an aircraft schedule even though the aircraft might have been fielded long before the subsystem).

11. What type of intraservice/interservice coordination problems contributed to difficulties in maintenance planning?

12. Was collocation of service personnel a factor in the decision making process as it related to maintenance?

Questions 11 and 12 were answered together. Question 12

was an extension of question 11. There was an almost even split between the two major issues. There were seven responses in which collocation of personnel between services was identified as one of the major interservice issues requiring attention. Most of the respondents stated that collocation of other service personnel on their program rarely occurred. This extreme lack of collocated personnel made maintenance planning more difficult and forced AF personnel to sometimes interpret requirements for the other services for lack of an immediate source. Most of the people who mentioned the lack of collocated personnel as a major problem felt that maintenance planning and decisionmaking could be greatly facilitated by having someone from the other service who knew their service's requirements and how they plan maintenance.

There were eight responses that addressed intraservice problems with the number of focal points. The data indicated a range of problems in this area. The main issue was that there were too many focal points within the other services required to make decisions regarding maintenance. The organizational structure of the services appeared to be the primary contributor to this problem. In the other services there is much more involvement between the program office, levels within the acquisition structure, and other commands. For instance, the Army has more commands involved in the day-to-day acquisition of weapon systems. This requires additional focal points, and additional coordination within the other

service. The respondents said that this lengthened the coordination time necessary to shape decisions. The was only one response provided that was relevant to coordination problems between the SPOs. This was not considered a significant issue and only a concern when there were two programs that functioned together and both were being managed by the same division.

The interservice problems are the same as those mentioned for intraservice. Like intraservice issues, the services have problems caused by their chain of command/organizational structure which requires more coordination between the services and lengthens the time necessary for coordination. It was suggested that the shorter chain of command allowed elevation and resolution of maintenance related problems more quickly.

13. Did language barriers (acronyms) contribute to the coordination/decision making difficulties and indirectly affect maintenance planning?

Each respondent indicated that language barriers in the form of acronyms existed to some degree. However, there were only four respondents that indicated these had any type of adverse impact on coordination and decisionmaking, thereby effecting maintenance planning. The underlying theme was that acronym/terminology usage made it difficult to talk in the same language. The difference in terms used made understanding maintenance requirements more difficult. The four who responded affirmatively generally felt that discerning

the differences in terminology was a learning curve process and that, although in their early association they sometimes confused each other with service-peculiar jargon, the problem gradually dissipated.

14. Who made the final decisions on maintenance requirements? How were those decisions made?

There was a definite indication from the data provided for question 14 that how decisions were made was a more important factor than who made the decisions. Eight of the responses indicated that the decisionmaker was usually determined by which service was the executive agent for the program regardless of how their decision affected the other service. The respondents suggested that this affected how decisions were made because the executive service representatives would normally make decisions on the basis of their familiarity with their service's requirements.

15. Was independence in decision making and/or contractor participation a factor in how well or how easily maintenance planning/implementation was accomplished?

Of the sixteen respondents, twelve indicated that independence in decisionmaking was a problem affecting how well maintenance planning was accomplished. The majority of the responses indicated that independence in decisionmaking, or the lack thereof, was mainly associated with the amount of coordination required by the other services to make maintenance planning decisions. Unlike the AF, the other services

have more people involved in the decisionmaking process at different levels and that makes arriving at and coordinating decisions more difficult. Most people stated that a certain degree of coordination was necessary in the maintenance planning process but they questioned the number of people that had to be involved at numerous levels. The four other responses were concentrated on contractor participation. Two of these responses indicated that contractor involvement in maintenance planning via service contracts was unwarranted to the degree that it complicated decisionmaking on maintenance. The other two responses indicated that neither independence nor contractor participation were applicable to the ease of performing maintenance planning.

Section III - Maintenance/Operational Concept

Maintenance/operational concepts and planning factors have long been considered major determinants of the maintenance capability established for weapon systems. These concepts are important because they provide the foundation for the maintenance capability to be established. The maintenance concept is essentially a plan that details how a systaem will be maintained during its operational life. It specifies how the system will be repaired, what levels of maintenance will be used, what types of maintenance will take place at each level and other factors. The operational concept defines the purpose of a system, how it will be operated, the types of missions it will be used for, the environment it will be used

in, and systems it will be used with (e.g. a pod system would be used with a specified aircraft). Their importance to the maintenance planning effort cannot be denied. With this in mind, the questions in this section were asked to determine what aspects of maintenance planning were affected, to what degree maintenance and operational concepts contribute to maintenance planning problems, and to what extent service usage/environments effect maintenance planning/implementation.

16. What areas in maintenance planning are most affected by maintenance/operational concept differences?

There was a range of responses provided for this question. The maintenance planning areas affected that were most frequently addressed were support equipment (SE), technical orders (TO), and source, maintainability, and recoverabil (SMR) codes. Seven responses identified SMR coding as the most critical area affected. Further explanation provides the raticnale for this assessment. SMR coding is used to determine what method will be used to return a piece of equipment to operational status. The SMR code determines if the item will be repaired by replacing the failed unit, repairing the broken item, or discarding the item altogether. It also determines at what level the item will be repaired, organizational, intermediate, or depot. This directly influences how and what maintenance takes place.

Support equipment and technical orders had five and four responses respectively identifying them as areas most affected

by maintenance/operational concept differences. Responses in this area indicated that SE and TOs were affected mainly in terms of how their requirements were developed. In the case of TOs, this primarily concerned format and reading grade level requirements. TO requirements such as reading grade levels which affect the maintainers ability to comprehend the maintenance instructions, and format requirements which determine how the TO is formulated both affect maintenance planning by establishing minimum requirements necessary to allow the use of the TOs by the maintainer in the field. Each of the services have different requirements for these TO areas which invariably affect maintenance. For SE the number, type, and testing capability were the requirements most often questioned or affected. These areas were most questioned because they will determine what will be used to maintain equipment once it is fielded and it will determine what maintenance planning is necessary to ensure that it is available. A shortfall in numbers, the particular type, or the testing capability of SE can undermine the maintenance the maintenance capability for future systems.Provisioning and data collection were other areas mentioned to be affected by maintenance/operational concept differences. However, the respondents felt that these areas were more directly influenced by SMR coding.

17. Do service maintenance concepts contribute to planning difficulties on joint service programs? How?

18. Do service operational concepts contribute to planning problems on joint service programs? How?

These questions were asked to determine if individual service maintenance and operational concepts contribute to maintenance planning problems in the viewpoints of ASD logisticians and how they contribute to these problems. A tabulation of responses are listed in Table 3-3 as follows.

TABLE 3-3

Do Individual Service Maintenance/Operational Concepts Contribute To Maintenance Planning Problems?

	Yes	No/Undecided
Maintenance Concept	12	4
Operational Concept	12	4

The interviewer found that the respondents answered this question as if it pertained to only one area (i.e. if they answered yes for the first part they also answered yes for the second part). The people who gave negative/undecided responses suggested that maintenance/operational concepts as practiced by the individual services probably did not contribute a great deal to maintenance planning problems but were apparently not sure that this was the case.

When asked how individual service maintenance/operational concepts contribute to maintenance planning problems the aggregate responses were quite similar. For maintenance concepts most of the difficulty was attributed to the differences in levels of maintenance used by each service and the

maintenance capability stipulated in service maintenance concepts. Each service employs the three level maintenance concept (organizational, intermediate, depot) but with adjust ments to accomodate service operational needs. The AF uses a straight three level concept and two level (O & D) when warranted. The Army, on the other hand, must consider O & I maintenance performed at the forward and rear lines of battle and makes accomodations for this maintenance. The Navy also makes accomodations in their maintenance concept for the differences between the maintenance capability at land and at sea, particularly in their I-level facilities. Most of the respondents agreed that the operational concept,like the maintenance concept, does contribute to planning problems. This is primarily because the operational concept will determine what maintenance you're capable of performing, how equipment can be utilized, how much maintenance will be necessary, and when/where it can be accomplished.

19. How does system use within the service affect maintenance planning?

This question was written to see what affect service use of the equipment had on maintenance planning. There were various responses to this question. Seven of those responses indicated a concern with what equipment would be used. In particular, SE was the equipment addressed and comments indicated a concern over what equipment was available for joint use by the services to perform maintenance and what new equipment could be developed, if required, that was compati-

ble for joint use without compromising individual service requirements (e.g. MAIE for AF). There were four responses regarding equipment usage. Of particular concern was how long could a system or piece of equipment could be used based on the specific service's use of that equipment. How a system is used by a service and the expected operating life of that system for that particular service will determine certain maintenance planning requirements. The number of resources necessary to support the equipment and keep it operating during its useful life will be affected by these two factors. The other areas of concern were identification of spares to be provisioned (3 respones) and what consistent method of data collection could be developed based on service use (2 responses). Since not all items on joint service programs are 100% identical in form, fit, or function, spares must be provisioned for some unique items, in different quantities and for different levels (e.g. more line replaceable units might be required for O-level repair in the navy than are needed in the AF based on its usage). Because joint service systems are used to satisfy different operational missions, the maintenance planned may be different. Parts being repaired may be interchangeable between services and may either last longer or require more maintenance because of the way they are used. Maintenance data must be kept on these items and therefore, must be consistent to show what repairs were done and when they were accomplished.

20. How do levels of maintenance (as part of an overall maintenance concept) influence maintenance planning/implementation? To what degree?

The responses to question 20 were much like those to question 16. The intent of question 20 was to determine specifically how important a role the maintenance levels played in maintenance planning. Responses on maintenance levels and their effect on maintenance planning were very strong. There were ten responses in which people felt that the maintenance levels played a significant role in the maintenance planning process. The respondents felt that maintenance levels most significantly affected SMR coding which determines the possible repair alternatives (as mentioned in the response to question 16). SMR identifies requirements for aspects of repair. The codes determine at what level repairs can be done, what repairs can be done on a component, and the disposition of the item (i.e. repair the item, replace the item, or dispose of the item). In total, the SMR codes affect the maintenance concept, the maintenance capability, and the maintenance planning necessary. The respondents also felt that SMR coding affected other aspects of maintenance planning, in particular, provisioning of spares, TO development/usage, and the maintenance capability at each level of maintenance.

21. How do the operational environments impact the way maintenance is planned?

Question 21 is related to question 18 but was intended

to show what considerations of the operational environment must be taken into account to better plan maintenace. The most evident impact to maintenance planning as a result of operational environments is the determination of SE requirements that are consistent with operational constraints. There were eight responses indicating possible limitations of SE used and deployed because of the operational environment. For any system certain questions have to be answered relative to what SE could be used in the intended environment. For example: what space would be available and/or necessary to deploy the equipment specified? could the SE as well as the system it's used on perform reliably in the environment planned? would the equipment be susceptible to the operational environment? There were four responses relative to the impact of the operational environment on the ability to store spares, judge the useful life of these spares, and maintain an open and responsive pipeline. In an isolated location, such as those experienced by the Army and Navy, these factors become very important to the on-site maintenance capability.

Section IV - Service Business Practices

This section was developed to show some of the differences between the services in terms of practices and philosophies. It also identified some of the areas affected by these differences, how they impact maintenance planning, and their relationship to the previous two sections.

22. Does the emphasis of logistics in the program office

by the individual service play a role in maintenance planning? In what areas?

This question was asked to determine if a difference in logistics emphasis affected maintenance planning ability. Of the thirteen affirmative responses, seven felt that there was a definite relationship between the emphasis in logistics by each service and maintenance planning. This relationship was most evident in areas where there were coordination problems and personnel problems. The consensus as indicated by the data was that early emphasis of logistics is required to accomplish adequate maintenance planning. If you wait until the design is complete or a prototype is built, it is too late to have any impact on how maintenance is performed. Some people felt that the Navy was sometimes guilty of this practice because of a shortage of personnel and expertise.

23. How does service parochialism affect the way joint service programs do maintenance planning?

Preliminary indications prior to conducting the research indicated that parochialism was a major drawback of joint service programs and their ability to perform cohesive maintenance planning. However, responses on service parochialism indicated that it does not seem to be as pervasive a problem as previously indicated. Only five responses were made to this area and its effect on maintenance planning. Those responses indicated that parochialism was more of a problem to the services that are not the executive service because it

is sometimes the basis for who makes decisions. The respondents suggested that resolving this issue required attention above the program office level.

24. What supportability/maintenance planning problems are caused by service unique requirements and what integrated logistics support (ILS) elements are affected?

The purpose of this question was to identify some of the supportability problems effected by service unique requirements and to identify the major ILS areas affected. The responses identified three major ILS areas impacted by service unique requirements. These elements were SE, TOs, and provisioning. There were supportability problems in each of these areas affected by service unique requirements. One additional area affected by service unique requirements was the identification of requirements. There were four responses each in which SE interface and the ability to use joint service TOs were identified as major supportability/maintenance planning problems. Another area identified as a supportability/maintenance planning problem was the identification of requirements. There were three responses each in these areas. SE and TOs were considered the most significant problem areas from the respondents' viewpoint. These two were considered the most significant because of the differences in hardware, the capability of the hardware (for testing purposes), and the ability to use common repair instructions that reflect the different maintenance environments in which the equipment is repaired. The responses on funding/provi-

sioning and identification of requirements indicated a concern over how to get the two areas synchronized between the services. The services tend to do these differently which prevents a combined planning effort in these areas. The basis for requirements determination, funding/provisioning levels, and funding/provisioning techniques were identified as the primary areas of concern.

25. How does requirements determination as performed by each service affect the formulation of documents that are used or considered for maintenance planning?

This question was asked to provide an identification of areas and documents used to plan maintenance that are affected by how their requirements are determined. There were not many responses to this question primarily because most of the respondents felt that differences in requirements could possibly be accomodated if the services worked together to resolve certain issues. Of the responses provided, the areas/documents identified were SE, TOs, statements of work, request for proposals, data item descriptions, and spares. Identification of SE and TOs had to do with plans developed and used to ensure these requirements were met.

26. Do service business practices affect or contribute to problems in the other two areas regarding maintenance.

The purpose of this question was to determine if the interviewees felt that there were any crossovers in the responses between the service business practices and the

other two areas. Their responses are presented in Table 3-4.

TABLE 3-4

Do Service Business Practices Effect Or Contribute To Problems In The Other Two Areas Regarding Maintenance?

Business Practice Effect On	Yes	No
1. Coordination/decisionmaking	10	6
2. Maintenance/Operational Concept	14	2

Section U - Summary

This section was used to get some recommendations for improvement of maintenance planning issues from the interviewees, their opinions on the viability of joint service programs, and their assessment of the three areas in terms of their importance. The summary questions are repeated here for convenience.

27. How would you rank the three areas in terms of their importance to improving maintenance planning problems? Are there areas not addressed that need to be included?

28. Does the joint service concept still seem to be a viable concept?

29. What recommendations would you make for improving the ability of joint service logisticians to accomplish maintenance planning?

The ranking of each section in terms of its importance was accomplished by each interviewee. Each section was not always ranked by each interviewee. This accounts for the differences in the total responses in each category. The

results for question 28 are listed in Table 3-5.

TABLE 3-5

Section Ranking By Importance

	1st	2nd	3rd
Coordination/Decisionmaking	8	5	1
Maintenance/operational Concept	4	4	4
Service Business Practice	4	3	4

The interviewees identified other considerations that might affect the logistician's ability to plan maintenance. These considerations were as follows:

- The way in which a joint service program is developed: Programs that are already developed and are then provided to another service may or may not be more difficult to plan maintenance for because many of the requirements have bee "locked in". This allows only limited changes to accomodate the differences in service unique operational missions and/or maintenance capabilities. The size of the program may determine if this type of development takes place (i.e. it might work for a small program but is ill-advised for a major program such as an aircraft program).

- The perceived ability to develop a weapon system faster as a joint service program as opposed to a single service program: If this is one of the criterias for developing a joint service program, then time will be a limiting factor. This means that maintenance planning must start at program inception to allow adequate time to work out agree-

ments/requirements and get them coordinated.

Fourteen of the sixteen interviewees stated that joint service programs are still a viable concept. The overall theme of their responses was that joint service programs when properly administered can usually be viable, but there might always be some inherent problem that will exist on this type of program that cannot be fully resolved.

Recommendations provided for improvement were fairly consistent. They are as follows.

1. Delineate AF logistics responsibilities to see if they are being done by the other service. If not, the AF must work out how these functions will be accomplished.

2. The services cannot force peculiarities into a joint service system and therefore, should put logistics under one wholesale agency.

3. The Joint Logistics Commanders coordinating group should work out differences between the services in terms of joint service program responsibilities.

4. Management resources should be collocated into the same office. This should also include personnel.

5. AF logisticians must become familiar with the terms, maintenance concepts, and methods of the other service early in joint service program development.

6. There should be joint service direction/policy provided by a higher authority at the DOD level to resolve inter-service conflicts and provide direction.

7. Joint service acquisition should be accomplished by a

"purple suited" organization. (This recommendation would have all functions of joint service acquisition under one agency. Recommendation two would have all the logistics functions under one agency).

The results of the sixteen personnel interviews have been presented in this chapter. As mentioned earlier, these questions were very open-ended and therefore, precluded the use of statistical inferences. Chapter four will interpret the results from this chapter.

IV. Interpretation Of Results

The analysis of the personal interview data was presented in Chapter III. The author's interpretation of that data shall be presented here in Chapter IV. The findings for the data in each section will be presented in the same order as presented in the previous chapter.

Findings

Demographics. The experience levels of joint service personnel in ASD appeared to be somewhat low at 1.62 years on the average. The acquisition experience of personnel not including joint service experience was slightly higher (2.53 years) than joint service experience alone. Prior to conducting the research, the author expected the average single service acquisition experience to be higher. Most of the interviewees had gained some single service acquisition experience prior to working on joint service programs. It appears that prior acquisition experience would be advantageous to people who were candidates for joint service programs. However, that cannot be determined on the basis of this study.

Coordination/Decisionmaking. The data provided from the interviews indicate that there are some definite problems in coordination/decisionmaking that affect the logisticians ability to do maintenance planning. Specifically, there seems to be a need for early coordination, collocation of

logsitics personnel, and some consensus on how and by whom decisions are to be made. Although there was some coordination evident on each joint service program discussed, the coordination was not done early and consistently enough. It was suggested during the interviews that coordination of maintenance planning issues needed to be done early to preclude major problems "downstream" and that it must be done consistently. Sometimes decisions were made without the benefit of any discussion. In addition, early coordination might have facilitated agreements on documents and requirements used to accomplish maintenance planning in time to influence major decisions being made.

Responses to questions 11 and 12 indicated that collocation of logistics personnel was a "sore spot" on joint service programs. Collocation of personnel was the source of many complaints. The primary complaint was that there was no one from the "other" service located in the program office who knew and understood that service's requirements and could make decisions for them as they related to maintenance planning. It was also suggested that someone collocated in the program office with knowledge of the other service's coordination process and requirements would have greatly facilitated coordination between the services and vice versa.

Based on the responses to questions 14 and 15, it appears that how decision are made is more important than who makes those decisions. The responses indicated that freedom of jugement in decisionmaking is not as freely given to the

other services as it is to the AF. The immediate impact is that the other services must take longer to coordinate their decisions with the AF and it requires many more inputs to make a decision.

Maintenance/Operational Concept. There are some improvements required in the maintenance and operational concept area. Improvements in this area should pertain to defining the differences of these concepts between the services, addressing the areas in maintenance planning that are most affected, and addressing the limitations imposed by these concepts for maintenance planning on joint service programs.

The data indicate that support equipment, technical orders, provisioning, and funding were the primary ILS elements affected that impact maintenance planning. SMR coding differences between services was identified as another area affected which has an impact on maintenance planning. This is the most prominent because it affects the requirements developed in these other areas as well as determines how the maintenance will be planned. Problems with the ILS elements mentioned usually were concerned with usage factors, such as SE capability, types of equipment, quantities, formats, and usefulness.

Problems with the maintenance and operational concepts were: 1) the difficulty of defining the differences between service concepts that needed attention and addressing those differences in maintenance plans and 2) developing contingencies in the maintenance plans to handle the limitations

imposed by the concepts and environment the system is used in. According to responses provided for the questions 16 through 20 there are many things to consider once a maintenance and operational concept are specified. Many of these have to do with things like determining what/where/when maintenance can or will be performed, equipment capabilities/utilization, service requirement constraints, and the effects of the operational environment on spares, spares piplines, and the reliability of equipment.

Service Business Practices. The data indicate that there are some inconsistencies between the ways the services conduct business. These inconsistencies account for some problems, but these problems can also be attributed to issues in coordination/decisionmaking and maintenance/operational concepts. The most fundamental issues were 1) how requirements determination as performed by each service effects maintenance planning and 2) the degree to which logistics is emphasized up front by each service on a joint service program.

Most of the interviewees advised that logistics had to be emphasized up front on joint service programs to adequately accomplish maintenance planning. The responses indicated that equal emphasis by the services was not occuring as it should. This lack of emphasis appeared to affect the same areas as mentioned in the last section.

The differences in the way the services determine requirements was also considered a problem. This was particularly

true with respect to contractual type documents (i.e. SOWs, DIDs, specifications, etc.) and other requirements (e.g. SE/TO plans, provisioning and funding) that are used to delineate maintenance requirements. The contractual documents specified affect the requirements to be provided and used to carry out maintenance planning. The existing problems with the other requirements (i.e. SE/TO plans, provisioning, and funding) have been caused by procedural inconsistencies.

Summary

From all indications, ASD joint service program personnel have suggested that joint service programs are still viable and that cohesive maintenance planning can take place on these programs. Based on responses provided to question 27, coordination/decisionmaking is the most important area that impacts maintenance planning. It was also suggested that joint service programs would always have some problems resolving maintenance planning issues, but cohesive planning can take place on these programs given the proper attention.

Some additional considerations might also be addressed prior to joint service initiation. The conditions under which a joint service program is developed can also impact how smoothly maintenance planning occurs. Some conditions that must be considered are:

- Is the ability to bring the system into the inventory faster as a joint service program a primary basis for joint

service development?

- Should the size of a program and its current stage of development be considerations prior to selection for joint service development?

- Can joint logistics requirements be developed in cooperation for inclusion in the source selection process?

V. Recommendations And Conclusions

This chapter provides recommendations in each of the areas covered during the research interviews. These recommendations are made based on the data analysis and interpretation of results in Chapters III and IV respectively. Recommendations for future research will also be provided in this chapter.

Demographics

Experience levels of the people working joint service acquisition programs in ASD appear to be somewhat low. In some cases the people assigned to these programs had no prior acquisition experience at all. Most of the people currently working these programs were military which will affect the length of time they remain on these programs.

Recommendations: In order for a joint service acquisition program to be effectively managed to realize its cost saving potential, the people working these programs must have an adequate level of experience at least in the acquisition field. Steps should be taken to ensure that joint service positions are filled by people with some established minimum of prior acquisition experience whenever possible. Program continuity should also be considered when filling positions on these programs. The assignment of more civilian personnel to joint service acquisition programs could reduce continuity problems. This allows a more stable cadre of personnel to

work these types of programs who are not subject to periodic moves as a result of their duty status. In addition, some method for tracking people with prior joint service acquisition experience should be developed to identify them for possible selection for future programs.

Coordination/Decisionmaking

Coordination and decisionmaking problems are major issues affecting maintenance planning on joint service programs. Significant coordination problems affecting joint service maintenance planning are primarily confined to inter-service coordination. Most of these problems have to do with early/sufficient coordination and knowing whom to coordinate with in the other service. Decisionmaking problems were primarily confined to how decisions were made, who made decisions, reaching agreements on requirements, and knowing what is required by the other service to help make maintenance planning decisions. These issues are documented in Chapters III and IV.

Recommendations: To improve coordination and decisionmaking problems between the services, collocation of logistics personnel in the joint service program office should be mandated for all joint service programs (this would also apply to other functional areas). There should also be one person among the collocated personnel who serves as that service's primary focal point. Collocation of personnel has the potential for solving many of the maintenance planning

problems caused by coordination and decisionmaking difficulties. It would provide someone from the other service who is familiar with their service's maintenance requirements, has some knowledge of that service's procedures, is familiar with who is required to coordinate on requirements, knows the terminology of their service, and can participate with the executive service in decisionmaking efforts on maintenance planning issues from the beginning. This all assumes that the collocated person has some acquisition logistics background and that this total logistics effort is encouraged by all services involved from the very beginning.

Maintenance/Operational Concept

The maintenance and operational concepts are the most significant areas impacting maintenance planning on joint service acquisition programs. The maintenance/operational concepts and the environments that the services operate in are major determinants of what maintenance can be performed as well as what maintenance must be planned. A major finding in section III of the interview was that the services have problems defining and identifying the differences in the maintenance/operational concepts and environments and the limitations on joint service maintenance planning. This includes identification of the areas that are impacted and the adjustments necessary to develop cohesive maintenance planning.

Recommendations: Maintenance and operational concepts

should be the overriding concern on joint service acquisition programs, particularly when addressing maintenance planning. Identification of maintenance/operational concept differences must take place early in the joint service program development. Deficiencies should be noted and planning to meet the overall maintenance requirements and shortfalls should be the primary concern. All available resources that can be used "as is" or modified should be identified prior to the initial maintenance planning. The service representatives should also try to become familiar with each other's maintenance/operational concepts.

Service Business Practices

Service business practices that caused maintenance planning problems were mainly the result of inconsistencies between the services in requirements determination and the early emphasis of logistics on joint service programs. Procedural differences were also a factor in this assessment. The services have different requirements as well as different ways to determine these requirements. As a result the services are not always willing to make concessions which would allow the use of common requirements. The same service parochialism holds true for procedures used to identify these requirements. The end result is that there are unique requirements and procedures requiring maintenance planning to accomodate each service and joint service intent is violated. The logistics emphasis provided by the services was also out

of sync. This may be because of the way the program was developed. For whatever reason, this reluctance to compromise affects the ability of logisticians to do maintenance planning together.

Recommendations: To alleviate some the maintenance planning problems caused by differences in service practices there should initially be an equal emphasis of logistics "up front" on joint service programs. Early collocation of personnel could also be used to remedy this problem. The primary recommendation is that the services should do requirements determination together. In doing so, the services should try to standardize those requirements and procedures used on joint service programs so that there are not service unique portions that require additional maintenance planning. The services should also make accomodations for differences that go unresolved (e.g. SMR coding) and plan accordingly. One additional recommendation is the relaxation of service specific requirements that prohibit joint maintenance planning.

Summary

Chapter III presented some recommendations by the interviewees for improving maintenance planning on joint service programs and improving joint service programs in general. Some of these recommendations were feasible in the author's opinion. For the convenience of discussion these recommendations are repeated here.

1. Delineate AF logistics responsibilities to see if

they are being done by the other service. If not, the AF must work out how these functions will be accomplished.

2. The services cannot force peculiarities into a joint service system and therefore, should put logistics under one wholesale agency.

3. The Joint Logistics Commanders coordinating group should work out differences between the services in terms of joint service program responsibilities.

4. Management resources should be collocated into the same office. This should also include personnel.

5. AF logisticians must become familiar with the terms, maintenance concepts, and methods of the other service early in joint service program development.

6. There should be joint service direction/policy provided by a higher authority at the DOD level to resolve inter-service conflicts and provide direction.

7. Joint service acquisition should be accomplished by a "purple suited" organization.

Recommendations 1, 3, 4, 5, and 6 can conceivably be accomplished without too much difficulty. The most difficult part of these recommendations is delineating responsiblities between the services at the program office level, at the service level (to be done by the Joint Logistics Commanders), and becoming familiar with the terms, methods, and concepts of the other services. Collocation of resources, as mentioned earlier in this chapter, would go a long way to improv-

ing the current situation of joint service acqusition programs.

Recommendations 2 and 7, if achieveable, might also improve maintenance planning on joint service programs. However, these recommendations would run into much opposition and require a major restructuring of the military services in order to be accomodated. The amount of commonality that can be achieved in planning under one agency is even questionable. There could still be some division within that one agency over how different systems will be maintained.

This research was accomplished to identify some of the problems encountered on joint service programs in maintenance planning. This study was limited to AF logisticians at ASD with experience on joint service programs in which ASD is involved. Since the study was confined to ASD and covered broad areas that influence joint service maintenance planning, some caution must be taken when trying to generalize these conclusions to another product division or another service.

Recommendations provided in this chapter have been somewhat subjective out of necessity. They did highlight some of the maintenance planning problems caused be coordination/decisionmaking difficulties, maintenance/operational concept differences, and differences in service business practices. Joint serivce programs require additional research to "shed light" on these types of problems. These programs have the potential to save money in the acquisition of weapons by the

Department of Defense. Some questions for future research are as follows:

1. Can SMR differences between services be worked out on joint service programs?

2. What effect does joint service program development have on its possible success?

3. Are the results and recommendations rendered from this study applicable to other product divisions or other services?

4. How different are the maintenance principles of the three services? (This would require an in-depth analysis)

Appendix A: List of Interviewees

Berle, Col Terrence, USAF. Deputy of Acquisition Logistics, Aeronautical Programs, AFALC/OA, Wright-Patterson AFB OH. Personal Interview.

Berry, William, GS-12, USAF. Assistant Deputy Program Manager for Logistics Ground Launch Cruise Missile, ASD/YYLG, Wright-Patterson AFB OH. Personal Interview.

Blatchley, Capt Pete, USAF. Deputy Program Manager for Logistics Gunship Program, ASD/AFZL, Wright-Patterson AFB OH. Personal Interview.

Burke, 1Lt Regina, USAF. INEWS Logistics Engineer, ASD/RWWL, Wright-Patterson AFB OH. Personal Interview.

Cazzell, Jerry, GS-12, USAF. Deputy Program Manager for Logistics V-22 Joint Services Advanced Vertical Lift Aircraft, ASD/AFZL, Wright-Patterson AFB OH. Personal Interview.

Gibson, Alice, GS-12, USAF. INEWS ILSM, ASD/RWWL, Wright-Patterson AFB OH. Personal Interview.

Hughes, Lt Col Richard, USAF. Deputy Program Manager for Logistics Reconnaissance/Electronic Warfare Systems, ASD/RWWL, Wright-Patterson AFB OH. Personal Interview.

Hunter, Hollis, GS-12. Team Leader, Work Load Capacities/ DMI Studies, JDMAG/MAUA, Gentile AFS OH. Personal Interview.

Linen, Ron, GS-12, USAF. JVX Engine ILSM, ASD/YZAL, Wright-Patterson AFB OH. Personal Interview.

Mayeux, Lt Col Gilbert, USAF. Deputy Program Manager for Logistics Ground Launch Cruise Missile, ASD/YYLG, Wright-Patterson AFB OH. Personal Interview.

Mullins, Maj Larry, USAF. Deputy Program Manager for Logistics Combat ID System Program Office, ASD/AEIL, Wright-Patterson AFB OH. Personal Interview.

Pryse, MSgt Don, USAF. Automatic Liquid Agent Detector ILSM, ASD/AESL, Wright-Patterson AFB OH. Personal Interview.

Puckett, Eleanor, GS-12, USAF. Deputy Program Manager for Logistics IRST, ASD/RWNL, Wright-Patterson AFB OH. Personal Interview.

Rutledge, Larry, GS-12. Senior Project Officer/DMI Studies, JDMAG/MAUA, Gentile AFS OH. Personal Interview.

Stevens, Bob, GS-12, USAF. Deputy Program Manager for Logistics HH-60A, ASD/AFZL, Wright-Patterson AFB OH. Personal Interview.

Strobbe, Lt Connie, USAF. MCP-2P Chemical Defense Mask ILSM, ASD/AESL, Wright-Patterson AFB OH. Personal Interview.

Sweigart, Capt James, USAF. IRST ILSM, ASD/RWNL, Wright-Patterson AFB OH. Personal Interview.

Tinder, MSgt Roy, USAF. Commanders Tactical Terminal ILSM, ASD/RWQL, Wright-Patterson AFB OH. Personal Interview.

Vanderpool, Mac, GS-12. Project Officer/DMI Studies, JDMAG/MAUA, Gentile AFS OH. Personal Interview.

Appendix B: Interview Questionnaire

Demographic Data

1. What is your rank?

2. How many years of acquisition experience do you have?

3. How many years of joint service acquisition experience do you have?

4. How many years of acquisition experience do you have not including joint service experience?

5. How many joint service programs have you worked?

6. Are you currently working any joint service programs?

7. What is your position title?

Coordination

8. Were there any planning documents used in which agreements were reached prior to major decisions on maintenance planning?

9. Was there early and sufficient coordination between the services that might have helped facilitate maintenance planning?

10. How did service and program schedules affect your ability to adequately plan maintenance in terms of time?

11. What type of intraservice/interservice coordination problems contributed to difficulties in maintenance planning?

12. Was collocation of service personnel a factor in the decision making process as it related to maintenance?

13. Did language barriers (acronyms) contribute to the coordination/decision making difficulties and indirectly affect maintenance planning?

14. Who made the final decisions on maintenance requirements? How were those decisions made?

15. Was independence in decision making and/or contractor participation a factor in how well or how easily maintenance planning/implementation was accomplished?

Maintenance/Operational Concepts

16. What areas in maintenance planning are most affected by maintenance/operational concept differences?

17. Do service maintenance concepts contribute to planning difficulties on joint service programs? How?

18. Do service operational concepts contribute to planning problems on joint service programs? How?

19. How does system use within the service affect maintenance planning?

20. How do levels of maintenance (as part of an overall maintenance concept) influence maintenance planning/implementation? To what degree?

21. How do the operational environments impact the way maintenance is planned?

Service Business Practices

22. Does the emphasis of logistics in the program office by the individual service play a role in maintenance planning? In what areas?

23. How does service parochialism affect the way joint service programs do maintenance planning?

24. What supportability/maintenance planning problems are caused by service unique requirements and what integrated logistics support (ILS) elements are affected?

25. How does requirements determination as performed by each service affect the formulation of documents that are used or considered for maintenance planning?

26. Do service business practices affect or contribute to problems in the other two areas regarding maintenance?

Summary

27. How would you rank the three areas in terms of their importance to improving maintenance planning problems? Are there areas not addressed that need to be included?

28. Does the joint service concept still seem to be a viable concept?

29. What recommendations would you make for improving the ability of joint service logisticians to accomplish maintenance planning?

Appendix C: Interview Comments

The following are comments provided from personal interviews used to conduct this research. To prevent the association of any comment or group of comments to one person the comments were numbered using a random number generator.

Coordination

92. The AF on some occaissions would resist the navy way of doing business simply because we were unfamiliar with their requirements. Therefore, if navy personnel were not present to clarify certain issues, the AF would do it their way.

127. The navy seemed to do their scheduling at the aircraft level instead of at the subsystem level. They also seemed unwilling to identify any slack in their schedules. Since the aircraft schedule was used as a basis for planning instead of the subsystem schedule, this shortened the time available for maintenance planning. This forced us to do our planning according to their schedules.

433. Differences in terminology between the three services accounts for the difficulties encountered when planning maintenance requirements.

688. The different service terminologies and acronyms are problems that must be resolved. These differences cause us difficulties when we attempt to identify maintenance requirements and find that we are sometimes talking about the same thing.

221. Terminology differences between the services have contributed to many problems on the program. There was a learning curve in adapting to the navy terminology.

579. Terminology differences are a big problem on joint service programs because the services will use different words/requirments peculiar to their service that often mean almost the same thing.

170. The navy does things differently from the logistics standpoint. The logistics function is matrixed in but separate from the program office. This causes coordination problems when it comes to tasking.

745. The AF and navy had a difficult time agreeing on when

things would be done because they were planning to two different schedules.

741. The navy was slow in responding to our service requirements and therefore certain decisions that had to be made were delayed because of lack of coordination.

638. There was not a major focal point available to work with. Approval of decisions required coordination with several people at several different locations. This often hampered our ability to make decisions and stay within schedule.

812. The navy has a shorter chain of decision making which allows them to escalate issues to upper levels within the command much faster. Their organizational structure is not as deep as the air force's.

838. Since each service's logisticians were not collocated in the same office distance was a major factor in getting decisions made. This required a longer period of time to process data and prevented the discussion of classified information.

381. Since each service was not familiar with the other service's acronyms and organizational structure we found these areas to be a barrier to getting the work done. Often times we would be be using different acronyms but be talking about the same kind of requirements.

306. The AF had to work with four or five different people who were all working logistics for the other service. This increased the amount of coordination on our part to insure requirements were met.

857. None of the navy's logisticians were centrally located in one office. Therefore, the people you had to contact depended on what problem you were working.

180. Since the approval level was at the Pentagon level this caused us to receive conflicting guidance and direction. This only forced us to work harder to get certain decisions made.

255. The AF and navy could not decide who had the final say on reliability and maintainability (R & M) decisions. This caused contractual problems regarding the definition of certain R & M parameters.

526. The navy had most of their logistics planned or performed by the contractor but coordinated by some service focal point. This slowed down coordination efforts required for maintenance planning.

245. Some decisions were made based on the fact that the AF

was the executive service and familiar with their own way of doing things.

731. If ICS was required on the program we would have to work with one group of people to plan the necessary spares quantities for ICS and another group of people for when the system became operational.

162. Many of the decisions that were made were driven by the other service's schedule even though we were buying most the end items.

18. The AF sometimes can't make decisions regarding depot repair early in a program because of a lack of a DMI decision. This only allows discussion of generalities in regards to maintenance whereas another might be able to discuss specifics.

313. During the source selection process the navy held their source selection at an offsite. This made the source selection process ineffective because it forced the AF to interpret navy requirements and make decisions based on these interpretations.

387. There were no collocated logistics personnel in the program office. This became a big problem during the RFP formulation because it slowed down the approval of the RFP package. The AF also was forced to interpret the navy's maintenance requirements to some extent.

225. We received no substantial input from the other service's users, nor did they commit to any requirements. This made it difficult to plan maintenance for the system.

903. The navy organizational structure is narrower than the AF's. This allowed them to elevate major problems and issues to higher levels in their service much faster.

595. The navy counts on the contractor to accomplish their logistics planning. Therefore, documents we receive may be generic in nature if the navy contractor has not responded to them. This slows down our ability to make decisions to solidify maintenance plans.

844. There were coordination problems that existed between the two service logistics offices and the aircraft SPO that precluded a smooth planning effort.

231. The lead navy logistician was not physically located in the program office to clarify navy requirements when questions arose.

607. Lack of responsiveness often created problems in deci-

sion making when coordination was necessary.

373. It seems that the navy does not have management expertise in every functional area and therefore depend on the contractor and the other service for what is decided on their program.

855. It seems that the other service logisticians are not as free to make decisions as AF logisticians are. This in turn requires more communication/coordination between their decision makers and the people doing the work.

579. The service that serves as the executive agent will sometimes make decisions regarding requirements based on their service regulations and directives.

841. Coordination is a major problem because the army requires coordination of all maintenance plans by numerous levels within the command.

809. The AF usually has a point of contact at each level for coordination purposes but the army has many levels at which coordination is necessary.

416. Army acquisition is not as centralized as the AF which causes an increase in the time allowed to coordinate maintenance related decisions.

238. The army user does not get involved sometimes until the system is almost fielded. If user requirements are not identified early in the program development maintenance planning to satisfy those requirements are all the more difficult.

258. The army depends on numerous people to make decisions regarding maintenance requirements on a contract.

17. The time required for maintenance planning and coordination might have been shorter if this had been a single service program.

987. The AF logistician had to interface with many counterparts in the army for different aspects of the program which sometimes caused guesswork on his part.

768. Each service was involved early in the program and there is an agreed to ILS spec and ILSP that has helped to facilitate the maintenance planning process.

695. There have not been many problems in coordinating maintenance related decisions because of the early involvement of both services on the program.

225. The decisionmaking process was made more difficult by

the fact that the program manager and the logistician for the other service were not located in the same place. This

lengthened the amount of time it took to get decisions coordinated.

570. The navy often had trouble communicating with other people in the navy because of the number of people involved in requirements determination and the geographic distances between these people. This forced the AF to interpret navy requirements when decisions had to be made and coordination was not complete.

521. The navy seemed to be reluctant to get ASD's opinion on program issues. Important decisions that effected the AF were sometimes made without the benefit of AF input.

610. Even though the AF has program managers collocated with the other service the logisticians are not collocated and the PMs cannot adequately address logistics.

925. ASD often plays catch up when decisions are made without them by the lead service.

591. In some disputes between the services the executive agent (navy) has made big decisions that caused us to reaccomplish maintenance planning in support of that system.

488. Since there is a cost cap on the program and the AF is not the executive service, it seems that AF maintenance requirements are included only if they are needed by the other service.

633. Service parochialism has sometimes been the basis of some support decisions and some of these decisions have been made without the benefit of AF inputs.

516. Coordination could have been greatly improved if someone from the navy had been physically located here. Because there was noone from the other service here, the length of time to coordinate decisions increased on the range of five to seven days.

974. Coordination between services did not seem to be much of a problem in relation to our ability to do maintenance planning since the AF version was like an add-on.

257. It appears that the lead service makes decisions on the basis of their methods and expects the other services to follow their lead. This leads to problems downstream when decisions requiring compromise become locked in concrete.

55. Coordination is often lacking because of a need to meet a

particular date. This shortens the time in the coordination cycle to review documents and data used to accomplish maintenance planning.

Maintenance/Operational Concepts
and Planning Factors

800. The AF and navy could not decide who had the final say on reliability and maintainability (R & M) decisions. This caused contractual problems regarding the definition of certain R & M parameters.

43. If ICS was required on the program we would have to work with one group of people to plan the necessary spares quantities for ICS and another group of people for when the system became operational.

303. The AF sometimes can't make decisions regarding depot repair early in a program because of a lack of a depot maintenance interservice (DMI) decision. This only allows discussion of generalities in regards to maintenance whereas another might be able to discuss specifics.

396. The difference between service operational and maintenance concepts effects technical orders (T.O.s) and the way equipment is used which ultimately effects the way maintenance is planned.

222. Operational concepts often play a role in maintenance planning. For example, the navy deploys to a theater of action which might require them to have huge avionics intermediate shop (AISs). The AF, on the other hand, deploys to a base and does not require the same amount of equipment because of their ability to more readily transport parts to a depot if necessary.

514. Operational differences cause major differences in how provisioning is planned because of how the equipment is used and how items are spared. The services do not always spare to the same level. When sparing is done available space and the basis of repair (SMR code) for an item must be considered.

809. Since the army uses five levels of maintenance (depending on who you talk to) as opposed to three, there can be major problems when planning maintenance and how it's to be implemented.

157. The navy tries to do as much maintenance on ship as possible to make maximum use of their test equipment. This maintenance philosophy precluded the use of two level maintenance desired by the AF.

257. The navy has a family of SE they use on the carrier

which would have met their needs. The AF would have to use and develop augmentation equipment to have the same maintenance capability at an increased development cost. These factors become important when determining what SE will satisfy the requirements set forth in the maintenance concept. Additional planning would be necessary to accomodate this requirement.

929. The navy uses different source, maintainability, and recoverability (SMR) coding on their equipment which effects the how the equipment is repaired, at what level it's repaired, or if it's repaired at all.

419. The navy cannot easily adapt to a two level maintenance concept because of the isolated carrier environment. This requires additional planning to accomodate the navy regardless of the system reliability.

620. Differences in the maintenance and operational concepts made maintenance planning much more difficult.

199. The design will effect the support concept planned for a system and becomes a much bigger factor when there are differences between the services on support concepts.

286. The AF wanted to use built-in-test (BIT) to isolate to the SRU to the maximum extent possible but this directly conflicted with the navy concept of maintenance because of problems they have with BIT due to hard landings on the carrier. The use of BIT is a major determinant of the maintenance concept used.

935. The navy wants as much capability at their I-level shop as they do at their depot because of the carrier environment. This becomes a problem when SMR coding takes place.

99. The navy often does maintenance 24 hours a day on ship as opposed to two 8 hour shifts used by the AF. This effects maintenance manpower requirements. In addition their pipeline must be short to keep their planes flying. These factors become important considerations when planning the maintenance capability for a system.

427. The divisions within navy (i.e. air, surface, and underwater) operations effects where emphasis is placed in maintenance planning.

225. Navy wants to be self-sufficient on the carrier because of the short pipeline time afforded. It seems that they prefer to carry more piece parts as opposed to SRU/LRUs to allow them to achieve this objective. This becomes a big factor when it comes time to decide how the system is maintained (i.e. R & R or repair).

202. The mission of navy aircraft is different from that of AF aircraft in that they fly shore to strike type missions. This requires the placement of parts and equipment in different locations. These differences effect the support required as well as the maintenance equipment used.

453. The navy stipulated maintenance concept called for I-level repair down to the piece part. This was in direct conflict with the AF philosophy which would have made this repair a depot repair. Add to this the navy's desire not to add additional equipment which further complicated the issue.

110. Because it appears the navy does not keep the same amount of maintenance records as the AF, the AF has to figure out how to work around this problem for maintenance tracking purposes.

320. The maintenance concept planned for this system is three level from the AF standpoint. However, this becomes complicated when considering the army three level maintenance concept which can be considered five level because O & I maintenance have two additional categories: rear and forward maintenance at each level.

257. The operational concept of this system will require it to be deployed further out than the AF system. Because of this concept, maintenance must be planned to allow the quickest repair of the equipment to return it to an operational status. Therefore, SMR coding would have to be decided accordingly to accomodate this aspaect. Additional planning must take place to accomodate these differences in maintenance because of this situation.

640. A difference in mission requirements has caused us considerable problems in determining how the system is to be maintained.

24. The army has five levels of maintenance and does most of its repair in the field by replacing failed items. This repair practice is born out of necessity because of the army's deployment mode. However, the AF has to account for this situation when performing maintenance planning.

977. Because the operational missions were different for each service, special care was taken to try to work out an agreeable maintenance concept.

225. There is a large degree of commonality between systems which has allowed for a somewhat compatible maintenance and operational concept.

734. There have been some unique support equipment require-

ments to handle the different environments the system will be exposed to because of the operational missions.

713. Maintenance planning for the depot level has become complicated to some degree because of the AF's inability to do certain repairs.

471. Minor adjustments were necessary in maintenance planning to account for the different intended use by the navy.

245. Since this is a small program that was already well developed before the other serivice came on board, and has virtually the same intended use, the maintenance planning factors remained pretty much the same.

540. The navy depends heavily on their on shore depots and essentially uses two level maintenance (O & I) on their smaller ships. The AF operates from a Main Operating Base (MOB) and deploys to an austere location in which they depend heavily on spares and a spares pipeline. These factors must be considered up front in the maintenance planning effort.

870. Becausr this system had early coordination between the navy and the AF, the differences in maintenance philosophies has not posed a major problem.

979. Use of logistics support analysis (LSA) has allowed the consideration of each service's maintenance concept.

177. Each service performed its own SERD processing. This has allowed each of the services more flexibility to plan a support package provided the services talk to each other.

516. It appears that the navy I-level shop on the ship is not the same as the I-level shop on shore. This difference has required an increased amount of spares, money, and planning on the part of both services to insure the required maintenance capability is available on ship.

413. A difference in operational concepts which does not allow a navy plane to fly without the the complete system has caused some differences in the maintenance concept desired. The inability to reach a concensus caused us to adopt the AF maintenance concept and call the navy version service unique.

138. Each service has its own version of the system and operational concept. This complicated maintenance planning and its implementation up to a certain point (contractor maintenance was planned for depot). However, when the depot plans changed, this changed the gravity of the problem.

393. Monitoring systems for this equipment is different between the three services but does essentially the same thing.

This becomes a problem when the item goes to another service depot for repair because of the way maintenance data collection occurs. Because of the differences in operational missions, the maintenance data collected is different for each service which causes unique problems.

546. Although the navy and AF are using three level maintenance for this item, the army prefers to use two level maintenance primarily due to the operational mission. This required some adjustments on our part to accomodate the army.

84. Because TO requirements are different between the services and there were many changes required the navy had to maintain their TOs separately.

313. The AF has agreed to look at the navy TO format but has an option to include TOs in the AF format to accomodate the differences between the services. However, the army TOs do not seem to be compatible with either service. The LSA has been used as a common base to work around some of these problems and has been very beneficial.

102. The two aircraft systems required different connectors because of TEMPEST requirements on one aircraft. Also, there are additional considerations when performing maintenance on TEMPEST aircraft. This required different maintenance specifications to accomodate these differences as well as additional planning.

65. The data collection systems proposed were incompatible but essentially asked for the same information. This created a situation where the data banks that capture maintenance related data would have been different. That situation, in turn, would have caused problems in determining when maintenance was to be performed.

319. The difference in reading grade levels and other technical order (TO) requirements between services seemed to preclude the joint use of TOs. This necessitated additional planning to ensure some agreed to solution was worked out so that some type of instructions were provided to perform maintenance.

Service Business Practices

354. The navy does things differently from the logistics standpoint. The logistics function is matrixed in but separate from the program office. This causes coordination problems when it comes to tasking.

384. When the navy selects GFE for use they let the field worry about the logistics (planned maintenance/repair) associated with that item. The AF addresses the engineering and

interface of the GFE in the program office.

225. The navy program office is manned at lower levels than the AF and depends on the contractor more for management. This becomes a major problem when maintenance concepts are being developed.

115. The navy seemed to do their scheduling at the aircraft level instead of at the subsystem level. They also seemed unwilling to identify any slack in their schedules. Since the aircraft schedule was used as the basis for planning, this shortened our time available for maintenance planning. This forced us to do our planning according to their schedules.

258. The navy did their funding under the aircraft line item instead of under the system line item. This was consistent with their planning efforts. This practice prevented the AF from getting visibility into the navy budget.

801. The navy had a tendency to use a "tight" specification and then back down on their requirements later on. This caused us problems in planning because we could not establish firm requirements.

852. The AF on some occaissions would resist the navy way of doing business simply because we were unfamiliar with their requirements. Therefore, if navy personnel were not present to clarify certain issues, the AF would do it their way.

627. The difference in reading grade levels and other technical order (TO) requirements between services seemed to preclude the joint use of TOs. This necessitated additional planning to ensure some agreed to solution was worked out so that some type of instructions were provided to perform maintenance.

381. The task of performing maintenance planning might have been facilitated if each service had some knowledge of how the other service did business prior to accomplishing the necessary planning.

306. The navy uses a specific detailed maintenance plan to plan their provisioning effort and the AF doesn't. This forced the AF to change their way of thinking to accomodate navy provisioning.

845. The statement of work was a big problem in that both services specified the same requirements but used different data item descriptions (DIDs). Each service had its own viewpoints on what was required in the SOW.

432. The data collection systems proposed were incompatible

but essentially asked for the same information. This created a situation where the data banks that capture maintenance related data would have been different. That situation, in turn, would have caused problems in determining when maintenance was to be performed.

376. The AF was driven to an AF requirement to use MATE support equipment while the navy was not held to this requirement. This became a significant issue when planning how the system equipment was to be tested because MATE is a service requirement and requires a waiver to get around.

936. Some decisions were made based on the fact that the AF was the executive service and familiar with their own way of doing things.

530. The navy and AF use different methods for computing spares requirements. The navy seems to provision to lower levels than the AF which makes for a potential shortfall in spares for the AF if the navy is provisioning. This will create a big problem if organic maintenance is planned and this problem is not addressed early in the program development.

908. The AF as a standard practice concentrates on logistics up front. The navy seems to want a demonstration of the hardware before they concentrate on logistics. These two philosophies are directly opposite and cause major problems from a maintenance planning standpoint.

556. The AF wants to influence supportability at the design level and the navy seems to address supportability after design. This contradicts the design to cost (DTC) philosophy used by the AF and can increase the cost and difficulty of performing maintenance.

68. Differences in terminology between the three services accounts for the difficulties encountered when planning maintenance requirements.

24. The AF tends to write more planning documents and emphasizes streamlining more. The navy seems to use more service contracts to accomplish some of their logistics tasks. This creates confusion when maintenance planning factors are being established.

370. The navy does not invest as many resources up front on their programs as the AF. Therefore, if budget cuts occur that effect logistics, a restructuring of resources must take place to ensure that a maintenance capability is provided for the system.

975. It appears that the navy prefers to spend their money up

front on technology as opposed to logistics. A considerable amount of work is necessary to accomplish maintenance planning because of this factor.

157. Because the services have their own way of doing things, compromises are often necessary. This sometimes causes the services to get less of what they might want from the maintenance and operational standpoints.

173. The services have their own requirements that often don't match. For instance, MATE and 1750A architecture was stipulated by the AF but was not compatible with what the navy preferred. Because of this fact, a common logistics support stucture was hard to plan.

377. The army requires more detailed data on their TOs than the AF. This incompatibility forces compromises to be made and additional planning to ensure a viable maintenance document is provided.

309. The army uses data review people to determine SOW, spec, and contract requirements. Unlike the AF these people might not work the logistics for the program office. This can be a problem when determining maintenance related requirements.

477. The different service terminologies and acronyms are problems that must be resolved. These differences cause us difficulties when we attempt to identify maintenance requirements and find that we are sometimes talking about the same thing.

279. Terminology differences between the services have contributed to many problems on the program. There was a learning curve in adapting to the navy terminology.

819. Terminology differences are a big problem on joint service programs because the services will use different words/requirments peculiar to their service that often mean almost the same thing.

745. Although there were differences between the way the services did business, these differences were not so insurmountable that maintenance planning problems could not be worked out.

731. Sometimes service differences are major contributors to what planning can take place. For instance, the differences between the army and AF TOs were so numerous that the AF could not justify using the army inputs to accomplish maintenance.

375. The way the services do business was not a major problem because of program structure (i.e. the AF program was just

its version of an already existing program).

52. Since each service was not familiar with the other service's acronyms and organizational structure we found these areas to be a barrier to getting the work done. Often times we would be be using different acronyms but be talking about the same kind of requirements.

698. Some decisions were made based on the fact that the AF was the executive service and familiar with their own way of doing things.

614. The AF sometimes can't make decisions regarding depot repair early in a program because of a lack of a DMI decision. This only allows discussion of generalities in regards to maintenance whereas another might be able to discuss specifics.

435. The service that serves as the executive agent will sometimes make decisions regarding requirements based on their service regulations and directives.

95. Service parochialism has sometimes been the basis of some support decisions and some of these decisions have been made without the benefit of AF inputs.

725. The navy tries to do as much maintenance on ship as possible to make maximum use of their test equipment. This maintenance philosophy precluded the use of two level maintenance desired by the AF.

66. The navy uses different source, maintainability, and recoverability (SMR) coding on their equipment which effects the way the equipment is repaired.

799. The navy wants as much capability at their I-level shop as they do at their depot because of the carrier environment. This becomes a problem when SMR coding takes place.

974. The navy often does maintenance 24 hours a day on ship as opposed to two 8 hour shifts used by the AF. This effects maintenance manpower requirements. In addtion their pipeline must be short to keep their planes flying. These factors become important considerations when planning the maintenance capability for a system.

731. The navy depends heavily on their on shore depots and essentially uses two level maintenance (O & I) on their smaller ships. The AF operates from a Main Operating Base (MOB) and deploys to an austere location in which they depend heavily on spares and a spares pipeline. These factors must be considered up front in the maintenance planning effort.

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Joint service acquisition of defense systems have the potential to provide cost savings to the Department of Defense by eliminating duplicated efforts. However, these types of programs experience many problems during their acquisition, particularly in the maintenance planning area. The author discovered that most of the problems in maintenance planning are in coordination/decisionmaking, maintenance/operational concept differences, and the differences in service business practices. Coordination/decisionmaking problems are most often affected by the lack of collocated logistics personnel. Maintenance/operational concept differences are most often hampered by the inability to define requirements, differences, and limitations imposed by service operational and maintenance concepts. Important issues affecting service practices are the unequal emphasis of logistics on joint programs and the way requirements are determined. After discovering these problems, the author makes recommendations for improvement.

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